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Dark Energy Spectroscopic Instrument: Instrumentation Overview

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The Dark Energy Spectroscopic Instrument (DESI) has embarked on an ambitious survey to explore the nature of dark energy with spectroscopic measurements of 35 million galaxies and quasars in just five years. DESI will determine precise redshifts and employ the Baryon Acoustic Oscillation method to measure distances from the local universe to beyond 11 billion light years, as well as employ Redshift Space Distortions to measure the growth of structure and probe potential modifications to general relativity. In this presentation I will describe the instrumentation we developed to conduct the DESI survey, as well as the flowdown from the science requirements to the technical requirements on the instrumentation. The new instrumentation includes a wide-field, 3.2 degree diameter prime-focus corrector that focuses the light onto 5020 robotic fiber positioners on the 0.8-m diameter, aspheric focal surface. This high density is only possible because of the very compact positioner design, which allows a minimum separation of only 10.4-mm. The positioners and their fibers are evenly divided among ten wedge-shaped petals, and each bundle directs the light of 500 fibers into one of ten spectrographs via a contiguous, high-efficiency, nearly 50-m fiber cable bundle. The ten, identical spectrographs each use a pair of dichroics to split the light into three wavelength channels, and each channel is optimized for a distinct wavelength and spectral resolution that together record the light from 360-980 nm. I will conclude with some highlights from the on-sky validation of the instrument.

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Yes

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